



Ethical Guidelines of Conventional and Islamic Practices to Prevent Foodborne Disease in Slaughtering Ruminants and their Meat Processing

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Abstract

Ruminants are major meat sources, yet the slaughtering them vary from one tradition to another. World Health Organization (WHO) and Food and Agricultural Organization (FAO)'s Codex Alimentarius Commission (CAC) guidelines for slaughtering ruminants focus on hygiene and safety to prevent Foodborne Diseases (FBD) while Islamic slaughtering guidelines focus more or less the same but add particularly for *halal* and *toyyiban*. Hence, these and other variations need to be interested and explored in order to practice accordingly. This study intends to analyze details of these two approaches, exposing their differences and similarities, through and within the foodborne disease prevention perspective. The literature search and comparative method are used. Total eighteen developed guidelines to be considered as the reliable sources are explored and two of them, CAC guideline and combination of *halal* guidelines from Department of Islamic Development Malaysia (JAKIM) & Malaysia Standard (MS) are chosen to follow as the completed and detailed guidelines. It is found that stunning is a major difference between conventional and Islamic practices. Slaughtering ruminants by method of *halal* and *toyyiban*, collectively known as *halalan toyyiban* with hygiene and safety will definitely be acceptable not only by Muslims but also the whole world population so that it should be ensured by following the relevant ethical guidelines for all meat consumers.

Keyword: Foodborne diseases (FBD), *Halalan Toyyiban*, Hygiene, Safety, Slaughtering

Abstrak

Ruminants adalah sumber daging utama, namun penyembelihannya berbeza mengikut tradisi. Garis Panduan Organisasi Kesihatan Sedunia (WHO) dan Organisasi Makanan dan Pertanian (FAO) dan Suruhanjaya Codex Alimentarius (CAC) bagi penyembelihan ruminan memberi tumpuan kepada kebersihan dan keselamatan untuk mencegah Penyakit Bawaan Makanan (FBD) manakala garis panduan penyembelihan Islam memberi tumpuan lebih kurang sama tetapi ada pertambahan terutamanya untuk halal dan toyyiban. Oleh itu, pelbagai variasi perlu menarik dan mudah diterokai untuk diamalkan dengan sewajarnya. Kajian ini bertujuan untuk menganalisis secara terperinci mengenai dua pendekatan, mendedahkan perbezaan dan persamaan, melalui serta di antara perspektif pencegahan penyakit bawaan makanan. Carian literatur dan kaedah perbandingan telah digunakan. Sebanyak lapan belas garis panduan yang dibangunkan untuk dipertimbangkan sebagai sumber yang boleh dipercayai telah dikaji dan dua daripadanya adalah garis panduan CAC dan gabungan garis panduan halal dari Jabatan Pembangunan Islam Malaysia (JAKIM) & Piawaian Malaysia (MS) telah dipilih sebagai garis panduan yang lengkap dan terperinci. Ia mendapati bahawa pemensen adalah perbezaan utama antara amalan konvensional dan Islam. Penyembelihan ruminan melalui kaedah halal dan toyyiban, secara kolektif dikenali sebagai *halalan toyyiban* dengan kebersihan dan keselamatan pasti akan diterima bukan sahaja oleh umat Islam tetapi juga seluruh penduduk dunia supaya ia harus dipastikan dengan mengikuti garis panduan etika yang relevan untuk semua pengguna daging.

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Kata kunci: Penyakit bawaan makanan (FBD),
Halalan Toyyiban, Kebersihan, Keselamatan,
Penyembelihan

Introduction

According to New World Encyclopedia, the ruminants mean any even-toed, hooved mammals that digest its food in two steps, first by softening it within the animal's first stomach, known as the rumen, then regurgitating the semi-digested mass, now known as cud, and chewing it again. Ruminants as common food animals are cattle, goats, sheep, bison, buffalo, deer, and camels. These food animals produce beef, mutton, lamb, deer and camel meats respectively for all food consumers of all times. At the same time, ethics means a set of moral principles in a field, and guidelines are advices how to proceed so that the ethical guidelines on slaughtering ruminants can be understood as the advices how to conduct slaughtering ruminants morally.

Foodborne diseases (FBD) are any illness that resulted from the consumption of food contaminated by pathogens such as bacteria, virus and parasites and also by ingestion of residues from any harmful chemicals or accumulating drugs. FBD is to be concerned in abattoir sector of meat industry since World Health Organization (WHO) mentioned that FBD are the problem for everyone in every country but it can be prevented with proper practices by meat and food handlers. Although the most common symptoms of FBD are gastrointestinal problems such as diarrhea, dysentery, vomiting, other serious consequences also involved like kidney and liver failure, brain and neural disorders, arthritis and even cancer and death. Hence, WHO (https://www.who.int/topics/foodborne_diseases/en/) stated in its official website that FBD is a wide spectrum of illnesses around the World because it can happen as the result of eating food contaminated with FBD pathogens or chemicals or toxin producing microorganism. Since the FBD contamination might occur at any stage of food process start from production to processing and then consumption, meat as a major source of food need to be ensured in line with safety compliance that include *halalan toyyiban* quality for only Muslims but also for other people to get physical and spiritual value of meat.

The relationship of slaughtering animals and the risk of Foodborne Diseases (FBD) that can be threatening to all food consumers are explained by former scholars (Rani *et al.*, 2017, Marimuthu *et al.*, 2015, Qekwana & Oguttu, 2014). FBD Pathogens

present in animal carcasses or shed in animal wastes, and it might transmit to meat handlers through equipment, tools and/or slaughter processing area and finally to the meat end users. Safety Compliance is important to ensure safety especially from FBD and to be in line with *halal* (permitted/lawful) compliance for Muslim consumers. It should be fully applied in actual slaughter process. The purpose of this study is to explore the ethical guidelines on slaughtering ruminants and meat processing between Islamic and conventional ways in order to practice with safety compliance accordingly to *halalan toyyiban* for the prevention of FBD.

Methods of Study

Ethical guidelines are derived from a variety of online literature sources by google search and surfing government or organizations' official portal and others such as Research Gate and EBSCO's documents. The term guideline is chosen to cover for variety of names such as protocol, code of practice, manual, recommendations or standard operating procedures and so on. Abattoir sector of meat industry have its related guidelines in which religious or conventional practices are involved and so that all selected guidelines are compared and categorized into similar groups.

Results

It is found that Islamic practice on slaughtering ruminants is not only *halal* (lawful) but also *toyyiba* (wholesome), while conventional practice on it is also covered by safety and hygiene. At the same time, it is noticed that animal welfare also plays a key role in meat industry in terms of ethics and meat quality. The guidelines by their detailed practices or recommendations on slaughtering ruminants are discovered from 5 groups of total 18 literature sources and these five groups go to three main concerns as pillars of ethical guidelines that are animal welfare, hygiene & safety, and *halalan toyyiban*. Details are shown in the following figure.

Total 18 literature sources that are explored for ethical guidelines in meat industry are developed in terms of three main pillars - animal welfare, meat hygiene & safety, and *halalan toyyiba*. Among these sources described, 13 (in group A B & C) are from the sources of conventional slaughtering practices and 5 (in group D & E) are described Islamic practices for ruminants. Major elements or components of all guidelines regarding slaughtering ruminants for prevention of FBD are discovered from these sources

and summarized accordingly. Details can be seen in the following table (1).

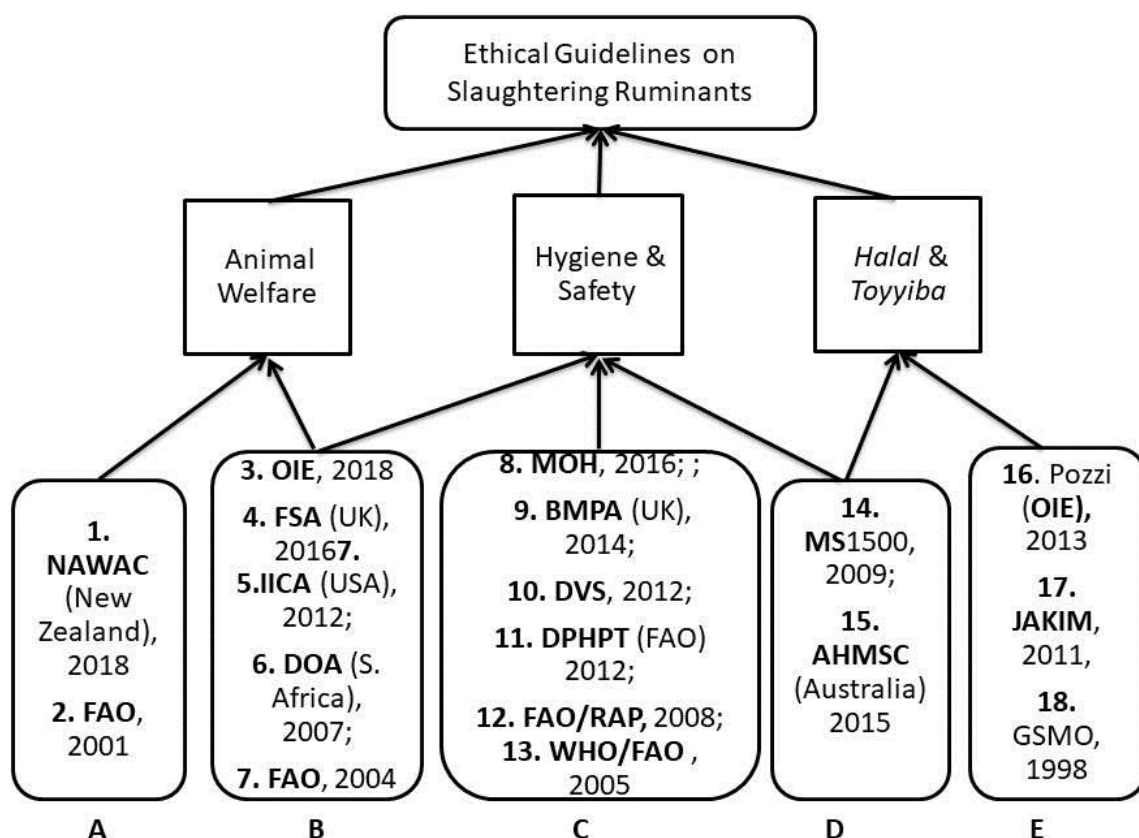


Figure 1: The five groups of ethical guidelines on slaughtering ruminants by their common specifications through animal welfare, hygiene & safety and *halal* and *toyyiban*

Table 1: List of Selected Guidelines in Meat Industry

Guideline Information and its Elements	Important Points related with FBD Prevention
Group (A): Guidelines more focus on Animal Welfare	
1. NAWAC (New Zealand) 2018 – 44 pages	Code of welfare in commercial slaughter includes general requirements, competence, large mammals include all ruminant such as cattle, goat and sheep, deer, camel; slaughter outside of slaughter premises by home-kill service provider; quality assurance program.
2. FAO of United Nations (Chambers & Grandin, 2001) – 91 pages	Guideline for humane handling, transport and slaughter of livestock includes animal stress and pain; effects of stress and injury on meat quality; good animal welfare standards including five major critical control points of animal handling and slaughter
Group (B): Guidelines focus on Animal Welfare and Hygiene & Safety	
3. OIE, 2018 – 838 (508 +	World Animal Health Organization's Terrestrial Animal Health Code includes general provisions –animal disease diagnosis, surveillance, risk analysis;

- 330) pages general recommendations: disease prevention and control, veterinary public health, and animal welfare;
4. FSA (UK, 2016) – 25 pages Red meat safety and clean livestock includes production chain for ruminant; factors affecting microbial contamination; pathogens associated with raw meat and meat products; clean livestock policy (CLP) @ five visible cleanliness score categories for ruminants.
5. (Linnette Murray-Peters (IICA), 2012) USA – 73 pages Principles of Slaughter Hygiene with three basis criteria which are 1) to eliminate the risk of infections and chemical residue accumulation and consequences of food poisoning, 2) to prevent spoilage, 3) to secure meat and good eating quality, appearance, and aesthetic value through proper handling.
6. DOA (South Africa) (Tertius Bergh (ed), 2007a) & 2007b), – (247) pages Meat inspector manual: abattoir hygiene and red meat includes transportation, traceability, animal identification practice, and risk analysis principles.
7. (FAO & Carrefour, 2004) - 312 pages Animal production and health manual includes risk analysis principles to meat sector; good practice in primary production; animal identification and traceability; transport of slaughter animals; ante-and-post-mortem inspection; pre-slaughter handling and slaughter methods; hygiene dressing and carcass handling; establishment, facility and equipment; personal hygiene; control systems such as HACCP for operation; and role of government or other regulatory authority in meat hygiene.

Group (C): Guidelines focus on Hygiene & Safety

8. MCS HACCP (MOH), 2016) Malaysia – 31 pages MCS HACCP includes general requirement, new certification, surveillance, renewal of certificate, audit procedure, evaluation process, validity, reapplication, certification of additional products, appeal, confidentiality, withdrawal of HACCP certification
9. (BMPA, 2014) UK – 222 pages Health and safety guidance notes for the mat industry includes training for health and safety, risk assessment in slaughtering and meat processing, safety in handling cattle/ livestock cleaning, disinfection and pest control, zoonotic diseases.
10. (Department of Veterinary Services (DVS) Malaysia, 2012) – 18 pages Code of veterinary practice (abattoir) covers for instructions for location, unloading and holding areas, building, process areas, workers room, storage and other facilities, hygiene and sanitation, conduct of workers and visitors, waste management
11. (DPHPT, 2012) (Kenya/Somali a) – 112 pages Public health training for trainer program includes training approaches; zoonoses, surveillance and management; food and environmental hygiene including slaughter facilities and meat markets and butcheries; FBD control and prevention.
12. FAO, RAP (Gunter Heinz, 2008) - 27 pages Abattoir development includes slaughterhouses for red-meat animals; slaughterhouse hygiene problems and solutions; designs and equipment recommendations for abattoirs including restraining livestock for *halal* slaughter.
13. WHO/FAO (CAC/RCP, 2005) - 52 Principles of Meat Hygiene applying to four main areas which are 1) animals presented for slaughter, 2) establishment, facility and equipment, 3) process

pages control, and 4) training in meat industry.

Group (D): Guidelines focus on Hygiene & Safety and *Halal* and *Toyyiba*

14. MS @ SIRIM, 2009, Malaysia - 18 pages MS1500:2009 Requirements include management responsibility; hygiene, sanitation and food safety; processing of *halal* food and drink; storage, transportation, display, sale and serving of *halal* food; and packaging, labelling and advertising; Compliance; *Halal* Certificates, and *Halal* Certification Mark
15. AHMSC (Zulfakar, 2015) Australia – 403 pages Australia's Halal Meat Supply Chain (AHMSC) operation includes the structure of AHMSC for export & domestic market; factors influencing the operations of AHMSC include perspectives of *halal* certifiers, meat processors, Muslim workers, industry association, *halal* meat retailers, and government; issues affecting AHMSC include institutional and operational issues

Group (E): Guidelines more focus on *Halal* and *Toyyiba*

16. (JAKIM, 2011) Malaysia - 32 pages Requirements including dedicated *halal* establishment, Internal *Halal* Control System, and *Halal* Slaughtering Procedures/Process; Responsibilities including *Halal* Certification Body, *Halal* Slaughter man, *Halal* Checker, *Halal* Supervisor
17. OIE Pozzi et al., (2015) - 15 pages Jewish *halacha* and Islamic *shariah* requirement and OIE recommendation, stunning method and derogations of slaughter obligation, slaughtering technique/ sticking, definition of slaughtering, unconsciousness evaluation time, wound management
18. SASO 630 (GSMO Board of Directors of GULF, 1998) - 5 pages Gulf Standardization and Metrology Organization of the GCC's Animal Slaughtering Requirements According To Islamic Law (Gulf Standard) includes details of four areas of requirements which are animals to be slaughtered; slaughter tool; slaughter method; and inspection, certification and stamps respectively.

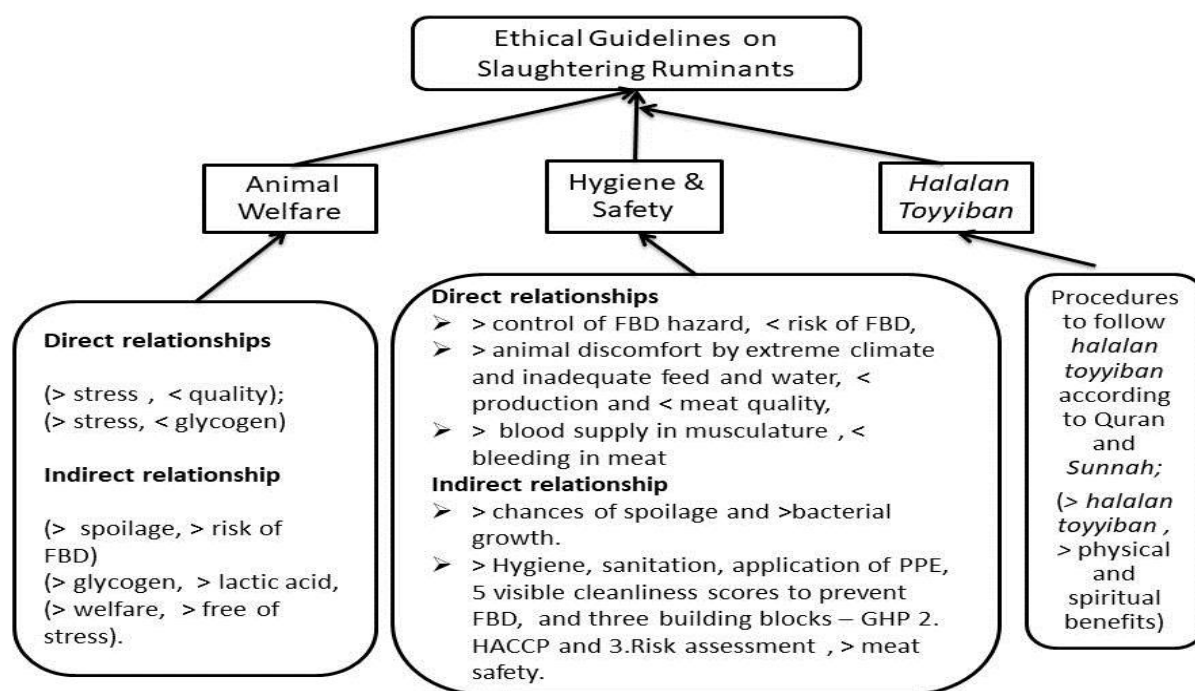


Figure 2: The key important points in preventing FBD from ethical guidelines on slaughtering ruminants by their direct and indirect relationships through animal welfare, hygiene & safety and *halal* and *toyyiban*

The Important Points in Selected Ethical Guidelines related with FBD Prevention

The key important points from the selected 18 guidelines are discovered in relation with three main pillars as described in figure. Regarding animal welfare, the guidelines 1-7 from group A, and B show the negative relationships between animal stress and meat quality (more stress less quality), between stress and glycogen (more stress less glycogen), between spoilage and risk of FBD (more chances of spoilage lead high risk of FBD) while positive relationship between conversion of glycogen metabolism (in muscle of lived animal) to lactic acid (in meat or carcass) as more glycogen lead to more lactic acid, and between welfare and stress (more welfare more free of stress), are found.

In term of hygiene and safety, the guidelines 3-15 from group B, C and D show that control of FBD hazard can reduce risk of FBD, five visible cleanliness scores can use in preventing FBD, animal discomfort due to extreme climate and inadequate feeding and watering negatively affect production and meat quality, more blood supply in musculature lead bad bleeding and hence chances of spoilage and high bacterial growth. Hygiene, sanitation, application of personal protective equipment (PPE) and three building blocks – 1. Good Hygiene Practice (GHP) 2. The Hazard Analysis Critical Control Points (HACCP) system and 3. Risk assessment are key points to be followed for meat safety. The guidelines

14-18 from group D and E show the procedure in following Islamic slaughtering way known as *halalan toyyiban*. Some direct and indirect relationships regarding key points from guidelines for preventing FBD can be seen in the above figure (2) and details of important points are described in the following statements.

The welfare of terrestrial animals NAWAC 2018 is stated that animals suffering from disease, injury or other abnormality may experience pain or distress. Animals to be slaughtered are supposed to be rested adequately so that injury, disease and physiological abnormal signs are not concealed at the time the animals are slaughtered. Swim washing to obtain clean condition with skin free of faecal contamination and wounds is strongly recommended by NAWAC due to minimizing animal stress that can cause as a major stressor by washing with water.

FAO (Chambers & Grandin, 2001) described that major critical control points of animal handling and slaughter to monitor good animal welfare, are stunning efficacy, bleed rail insensibility, vocalization, slipping and falling, and electric prods respectively. FAO also explained the relationship of glycogen (it level is high in muscle of well-rested healthy animal) and lactic acid (converted from glycogen after animals are slaughtered). This lactic acid is essential for the meat to be tasteful and tender so that meat can keep its good quality and colour. When the glycogen is finished up if the animal is

stressed prior to and during slaughter, the lactic acid level in the meat of animal after slaughter is reduced.

OIE, 2018 which is established and aimed for protecting animals and preserving our future, highlighted that Veterinary Public Health (VPH), contributed by veterinary services, provides food security and safety with respect to FBD including residues and control of zoonoses. Control of foodborne hazards is more effective in reducing the risk of FBD. Abattoir inspection of lived animals and the carcasses play a major role both in surveillance network of animal diseases and zoonoses to ensure the safety and suitability of meat and by-products. Any risk of compromising animal pain, e.g. slippery floor, should be rectified and outcome-based measures (e.g. bruises, lesion, behavior and mortality) should be used to monitor the level of welfare of animals.

FSA (UK, 2016) stated that good animal health is vital in the control of meat safety so that animal stress at any stage of the chain should be decreased for lesser incidence of defaecation occurred due to their stress and hence greater opportunity to reduce contamination. Five Visible Cleanliness Score for Ruminants that are Category I - clean & dry, II - slightly dirty, III - dirty, IV - very dirty, and V - filthy & wet, should be monitored and managed accordingly. Cleanliness category III, IV & V will have serious adverse effects on meat quality and so that these conditions should be avoided to pass slaughtering.

Linnette Murray-Peters (IICA), (2012) defined that animal welfare is an issue of serious concern not only for ethical reasons but also for the productivity of the animal. Animals that are stressed, experiencing pain due to injury or disease, and discomfort because of extreme climate or are inadequately fed, watered or housed will not produce to their full potential and the quality of their meat produced is compromised. The practice of slaughtering sick, diseased and dying animals in an attempt to salvage their meat is not permitted, since such meat can be a source of infection or food poisoning.

Tertius Bergh (ed), (2007a & 2007b) of DOASA explained the relation of animal stress and meat quality in the meat inspector manual that if an animal is under stress when slaughtered, the quality and shelf-life of the carcass and subsequent meat will be adversely affected. As a result of all stress factors glycogen reserves in muscles are reduced and consequently available less lactic acid which in turn leads to shorter shelf-life and less tender meat. Blood supply to the musculature is increased and this can result in the carcass not bleeding out well and hence

chances of spoilage and bacterial growth rate will be higher.

FAO & Carrefour, (2004) concerns for basic animal welfare that it is not based only on the satisfaction of human ethical needs, but also has to do with productivity. Animals that are stressed, experiencing pain or discomfort, or inadequately fed or watered will not produce to their full potential. It also highlights that meat hygiene requirements are to be fulfilled to control hazards that might occur throughout the whole food chain. Meat has traditionally been viewed as the culprit for a significant proportion of human FBD (FAO & Carrefour, 2004) and hence three building blocks 1. Good Hygiene Practice (GHP) 2. The Hazard Analysis Critical Control Points (HACCP) system and 3. Risk assessment should be used in the practical development of a specific meat hygiene program.

The Malaysian Certification Scheme for Hazard Analysis and Critical Control Point system MCS HACCP (MOH), (2016) describes procedures which apply to food premises in gaining HACCP certification. MCS HACCP checklists include seven important points to consider for FBD prevention. They are three points in establishments of design and facilities, maintenance and sanitation, and personal hygiene, and other four points in control of operations, transportation & distribution, product information & consumer awareness, and training program respectively.

British meat processors association (BMPPA, 2014) highlighted that Personal Protective Equipment known as PPE includes all equipment (e.g. helmets, aprons, gloves, footwear, etc.) which is intended to be worn by a person at work and which provides protection against one or more risks to health or safety. Department of Veterinary Services (DVS) Malaysia, (2012) described hygiene and sanitation in its Code of Veterinary Practice for ruminant abattoir (CVP) (A). The premises including equipment and the lairage must be cleaned and disinfected when necessary, PPE must be provided during slaughtering hour and adequate hand washing facilities, food dips also required to be provided and any behavior of unhygienic practices such as spitting should be prohibited in slaughterhouse and meat handling areas.

DPHPT, (2012) for FAO (Somalia) published that training to be conducted for all levels of abattoir operators so that their awareness will help to prevent FBD that is caused by consumption of food contaminated with pathogenic microorganisms either be fungus, bacteria, virus or parasite. Bacterial food borne infections are the most common and they include bacterial (*salmonellosis*, *shigellosis*, *Yersinia enterocolitica*, *E. coli*, *campylobacteriosis*, *Listeria*

monocytogenese and also viral (hepatitis A and poliomyelitis) diseases.

FAO, RAP (Gunter Heinz, 2008) stated that meat in supermarket and other quality meat shops undergo prolong storage of periods and there is a risk of massive spoilage or food poisoning bacteria growth if the raw material was heavily contaminated with the meat which might usually come from the traditional abattoirs. In addition, cattle slaughter on the floor is a major source of meat contamination. FAO clearly stated that meat chilled by supermarket and quality meat shop must be refrigerated at the abattoir immediately after the slaughter of animals before it is to be sold, and any prolong storage under ambient temperature also will boost speedy spoilage.

WHO/FAO (CAC/RCP, 2005) described that a risk assessment is required during preliminary risk management activities and includes four steps: hazard identification, hazard characterisation, exposure assessment, and risk characterisation. The output of this process is supposed to be integrated with all other factors relating to post-mortem meat inspection for making risk management decisions with proper procedures to control hazards.

MS1500:2009 of Department of Standards Malaysia, (2009) mentioned that the prerequisites in the preparation of *halal* food are hygiene, sanitation and food safety and so that it include various aspects of clothing, devices, machine, personal hygiene, processing aids, utensils and the premises for processing, manufacturing and storage of food. Australia's *Halal* Meat Supply Chain (AHMSC) (Zulfakar, 2015) also mentioned that all establishments involved with the production of *halal* meat are required to strictly adhere to the requirements, both meat safety as well as *halal* requirements. Malaysia is fourth of the top 15 countries with highest meat purchasing power of Muslim population from Australia according to 2012 list. The role of the *halal* personnel who are referred to the Muslim workers working as the *halal* supervisor or the *halal* slaughterman within the *halal* meat supply chain is very crucial as they represent the *halal* certifier's presence at the meat processors establishment on a daily basis. They must be competent in both religious and general meat production requirements aspects as they are the ones who are particularly responsible in deciding any uncertainty regarding the *halal* meat production and ensures the religious requirements are being strictly observed by the meat processors at all times.

In JAKIM, (2011), it is stated that the *halalness* of each product is important to ensure and it is to educate the industries on the concept of *halalan* *toyyiban* aspects related to the safety, nutrient content

and aesthetic appeal of *halal* products. Pozzi *et al.*, (2015) for OIE pointed out that the main issues referring to slaughter without prior stunning (*shechita* and *halal*) are represented by adequacy of the instrument (knife), decision, precision and position of the cut and correct management of the animal, immediately after the cut. The spirit of Jewish *halacha* and Islamic *sharia* appears fully aligned with OIE recommendations aimed to avoid any unnecessary pain to animals at the time of slaughtering.

Cooperation Council for the Arab States of the Gulf (GCC)'s GSMO stated that the requirements of the animal to be slaughtered should not be of the animals which are unlawful for Muslims to eat such as carrion, strangled and fatally beaten animal, animal dead through falling from a height, horn-butted animal, animal which has been partially devoured by predatory animals and animal which has been dedicated to any, other than God. Other prohibited animals are pigs, dogs, domestic donkeys, elephants, and mules; predatory animals, such as lions, tigers, and bears; predatory birds of prey, such as eagles and falcons. Above list of animals have high risk of getting FBD and zoonoses as well as shortage of working animals such as domestic donkeys, elephants, and mules.

A major difference between Conventional and Islamic Practice on Slaughtering Animals

For production of meat from food animals, the conventional and Islamic slaughtering methods are applied widely in the world. Conventional slaughter procedure includes stunning for immobilization of animals due to the concern to minimize animal pain. However, stunning is a major controversial issue for Muslims whether it can be increased or decreased pain of animal even though some *halal* authorities approved it to apply with the condition of revisable to the conscious state if animal is not slaughtered within a recommended period.

Minimum current levels recommended by OIE (according to 2018 animal health code) for head-only stunning are shown in the following table described by a comparative study with an Islamic practice issued by Malaysia Standard (MS1500:2009). It can be seen that the minimum current levels for cattle or cow and buffalo are significantly different by 1.5 amps in OIE and 2 amps in MS for cattle. It is an example of varying standard that lead to different results and so that stunning itself need to be considered to apply correctly. Differences of electric current for stunning can be notified in this comparative study between conventional and Islamic

practices. Even though Islamic practice required the current not to exceed until animal dead before slaughter, MS's minimum current for cattle is higher 0.5 amps than that of OIE.

Furthermore, it is noted that the stunning have the chances of animal dead before blood vessels are served, and so that it should not be used as *halal* unless it can approve reversible stage of animal by showing it's recovering from stunning.

Table 4: Differences of Electric Current mentioned in World Animal Health Organization (OIE) & Malaysia Standard (MS)

OIE Terrestrial Animal Health Code 2018, Vol. I: Article 7.5.7 Stunning		MS1500: 2009 Halal Food Production, Preparation, Handling and Storage, General Guidelines		
Species	Minimum current levels for head-only stunning (Amps)	Species	Minimum current levels for head-only stunning (Amps)	Time duration (second)
Cattle	1.5	Cow & Buffalo	2-3 & 2.5-3.5	2.5-3.5 & 3-4
Calves (<6months)	1.0	Steer (young bull)	1.5-2.5	2-3
		Calf	0.5-2.5	3
Sheep and goats	1.0	Sheep and goats	0.7-1.2 & 0.7-1	2-3
Lambs	0.7	Lambs	0.5-0.9	2-3

Limitation of Study

The findings of total 18 ethical guidelines are based on the available sources and other sources from meat larger amount imported or exported countries such as China, Japan, Thailand, Brazil and India are not available due to language barrier and limited time and capability of researcher and so that further studies need to be done widely.

Discussion

As explained above about the main elements and important points related with FBD prevention and a different in parameter of electrical stunning on cattle it is significantly discovered that animal welfare plays a key role to get good meat quality and free from FBD, and also it is directly related to meat hygiene and safety to prevent FBD while *halalan toyyiban* asks for purity to physical and spiritual requirements of consumers. Hence the combination of three essential building blocks that are animal welfare, hygiene & safety, and *halalan toyyiban* must be ensured to prevent contaminated FBD and to obtain the best quality of meat for consuming.

Conclusion

The conventional guidelines are seen as 13 of them from group A, B & C as shown in figure and 5 of them from group D & E are Islamic sources. Majority of them cover more or less the same for animal welfare with hygiene and safety. MS's guideline on

halal food describes on both procedures of safety and hygiene and *halal and toyyiba* while an Australia's *halal* meat supply chain and OIE (2013), JAKIM (2011) and GSMO of GCC countries more focus on *halalan toyyiban* in slaughtering ruminants and their meat processing. No guideline is jointly focused on welfare and *halalan toyyiban*. Finally, this study has been approved that the integration of all acceptable practices from three main pillars of the most reliable existing guidelines should be done for a complete and proper operator manual for ruminant abattoirs on prevention of FBD with safety compliance.

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